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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,090	03/01/2004	Peter Littlewood	4655-4000	2992

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EXAMINER	
KAYRISH, MATTHEW	

ART UNIT	PAPER NUMBER
2627	

DATE MAILED: 07/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/791,090	LITTLEWOOD ET AL.	
	Examiner	Art Unit	
	Matthew G. Kayrish	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) *12,22,27,28 and 35-39* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-21,23-26,29-34,40 and 41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: _____.

DETAILED ACTION

Response to Arguments

1. Claims 12, 22, 27, 28 and 35-39 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 6/6/2006.

2. Applicant's election with traverse of claims 1-11, 13-21, 23-26, 29-34, 40 and 41 in the reply filed on 6/6/2006 is acknowledged. The traversal is on the ground(s) that this is not a burden to the examiner. This is not found persuasive because there are several figures drawn to elemental layout with claims for each layout. Therefore, several species are present and examination of claims drawn to the species requiring additional searching, thus an increased burden on the examiner. The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 5-10, 13-17, 20, 21, 24, 25, 29, 31, 33, 34, 40 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Yu et al (US Patent Number 6707060).

Regarding claim 1, Yu et al disclose:

A magnetic field sensing structure comprising a first electrode (figure 3, item 31) and a second electrode (figure 3, item 35), the first and second electrodes being electrically coupled via a network (figure 3, item 33) comprising a plurality of discrete semiconducting elements (column 11, lines 38-39) providing a plurality of possible current paths between the electrodes (See figure 3).

Regarding claim 2, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the elements are disposed in a regular array (figure 3, item 33).

Regarding claim 3, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 2 in which the array defines a rectangular grid (figure 3, item 33).

Regarding claim 5, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the elements are disposed in an irregular array (column 11, lines 44-49).

Regarding claims 6-7 and 21, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which elements within the network are electrically coupled to three other elements (figure 3, one electrode couples multiple elements [33] together).

A magnetic field sensing structure as claimed in claim 1 in which elements within the network are electrically coupled to four other elements (figure 3, one electrode couples multiple elements [33] together).

A magnetic field sensing structure as claimed in claim 1 in which elements within the network are electrically coupled to at least three other elements, the number of electrical couplings varying between different elements within the network (figure 3, one electrode couples multiple elements [33] together).

A magnetic fields sensing structure as claimed in claim 1 in which some first elements within the network are electrically coupled to three other elements, and in which some second elements within the network are electrically coupled to four other elements (figure 3, one electrode couples multiple elements [33] together).

A magnetic field sensing structure as claimed in claim 1 in which the semiconducting elements are interconnected by means of conductive connections (figure 3, one electrode couples multiple elements [33] together).

Regarding claim 10, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 2 in which the array has first and second edge rows of elements defining first and second opposing edges and in which the electrodes are electrically coupled to the elements of the said edge rows (edge elements are also connected to electrodes [31 and 35]).

Regarding claim 13, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the dimensions of the elements are smaller than 1 μm (column 10, lines 21-26).

Regarding claim 14, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the dimensions of the elements are approximately 0.1 μm (column 10, lines 21-26).

Regarding claim 15, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the dimensions of the elements are larger than the mean free path of charge carriers within the elements (figure 3, each element [33] has a larger cross sectional area than thickness).

Regarding claim 16, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the elements are formed of any one or more of Se, Ge, Si-Ge alloys, etc. (column 4, lines 17-19).

Regarding claim 17, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the carrier mobility differs between different elements (column 4, lines 30-40, heavily doped semiconductors are more mobile than undoped semiconductors).

Regarding claim 20, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which a physical element dimension differs between different elements (column 10, lines 21-26).

Regarding claim 24, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the semiconducting elements are disposed on a substrate (figure 2, item 26).

With regard to claim 25, a "product by process" claim is directed to the product per se, no matter how actually made, see In re Hirao, 190 USPQ 15 at 17 (footnote 3, CCPA, 5/27/76); In re Brown, 173 USPQ 685 (CCPA 5/18/72); In re Luck, 177 USPQ 523 (CCPA, 4/26/73); In re Fessmann, 180 USPQ 324 (CCPA, 1/10/74); In re Thorpe, 227 USPQ 964 (CAFC, 11/21/85). The patentability of the final product in a "product by process" claim must be

determined by the product itself and not the actual process and an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not.

Regarding claim 29, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the network extends in three dimensions (column 4, lines 25-28).

Regarding claim 31, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 29 in which the elements define a simple cubic array (figure 3, item 33, column 4, lines 25-28).

Regarding claims 33 and 34, it is inherent that magnetic field sensing structures are part of a magnetoresistive sensor used in a read head for a magnetic disk or magnetic tape.

Regarding claim 40, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the said elements have substantially identical electrical properties (column 4, lines 30-39).

Regarding claim 41, Yu et al disclose:

A magnetic field sensing structure as claimed in claim 1 in which the electrical properties of the said element differ (column 4, lines 30-39, some of the elements will be similar while others will be different).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 4, 11 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al.

Regarding claims 4, 11 and 30, Yu et al fails to specifically disclose:

A magnetic field sensing structure as claimed in claim 2 in which the array defines a hexagonal grid.

A magnetic field sensing structure as claimed in claim 1 in which the elements are disk-shaped.

A magnetic field sensing structure as claimed in claim 29 in which the elements are spherical or octahedral.

However, as a matter of design choice and absent any statements of criticality, it would have been obvious to pattern the grid in any shape. Furthermore, as a matter of design choice and absent any statements of criticality, it would have been obvious to pattern the grids three dimensionally in disk-shaped or spherical configurations. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use different configurations of the semiconductor elements in the magnetic field sensor for the purpose of allowing for the simplest form for manufacturing to reduce costs.

8. Claims 18, 19, 23, 26 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al, in view of Kataoka et al (US Patent Number 5126667).

Regarding claims 18 and 19, Yu et al fail to disclose:

A magnetic field sensing structure in which the individual element carrier mobilities define a distribution having a mean and a spread, the spread being greater than the mean.

A magnetic field sensing structure in which the individual element carrier mobilities define a distribution, which is substantially gaussian.

Kataoka et al disclose:

A magnetic field sensing structure in which the individual element carrier mobilities define a distribution having a mean and a spread, the spread being greater than the mean (figure 5, mean is zero with a spread greater than zero).

A magnetic field sensing structure in which the individual element carrier mobilities define a distribution, which is substantially Gaussian (figure 5 shows a graph which will result from a Normal distribution).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the magnetic field sensing structure of Yu et al. with semiconductors whose electron mobility distribution is Gaussian, as taught by Kataoka et al to ensure that both N-type and P-type semiconductors are present in the sensor.

Furthermore, giving the distribution a spread greater than the average ensures that the current can be altered either forward or reverse biased within a very large range, as taught by

Kataoka et al, depending on the amount of voltage applied to the MR sensor. This ensures that larger currents, in both the positive and negative directions can be reached.

Regarding claims 23 and 26, Yu et al fail to disclose:

A magnetic field sensing structure in which the semiconducting elements are interconnected by direct contact, one with the other.

A magnetic field sensing structure in which the semiconducting elements are disposed on a substrate and are interconnected by virtue of a partial overlap, one with the other.

Kataoka et al disclose:

A magnetic field sensing structure in which the semiconducting elements are interconnected by direct contact, one with the other (figure 2, item 1).

A magnetic field sensing structure in which the semiconducting elements are disposed on a substrate and are interconnected by virtue of a partial overlap, one with the other (figure 2, item 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide direct contact or overlapping connections between the semiconductor elements in Yu et al's magnetic field sensor device, as taught by Kataoka et al, because this will ensure strong conducting connections, between the two opposite end electrodes, the whole distance from one electrode to the other.

Regarding claim 32, Yu et al. fail to disclose:

A resistance-measuring device for measuring the electrical resistance between the electrodes at a given magnetic field strength.

Kataoka et al disclose:

A resistance-measuring device for measuring the electrical resistance between the electrodes at a given magnetic field strength (column 2, lines 14-23).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Yu et al. with a resistance measuring device to measure the magnetic field strength on the magnetic field sensor, as taught by Kataoka et al, because this would measure the resistance of the sensor, therefore allowing for measurement of the voltage across the sensor to be measured. This will allow one to decipher the sensitivity of the sensor to a magnetic field, as well as its sensitivity to a change in voltage and current.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew G. Kayrish whose telephone number is 571-272-4220. The examiner can normally be reached on 8am - 5pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrea Wellington can be reached on 571-272-4483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197

(toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew G. Kayrish

6/15/2006

MK

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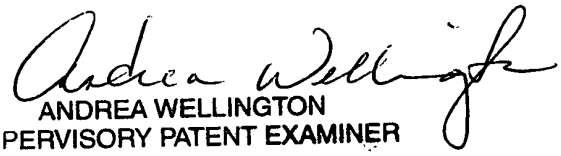

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